

through the first cervical ganglion, reaching the iris ultimately by way of the Gasserian ganglion and ophthalmic branch of the trigeminus. Other dilator fibres exist in the fifth nerve even before it reaches its ganglion, but, on cutting these, the reflex dilatation of the pupil is not interfered with as long as the filaments derived from the sympathetic are intact. Section of the ophthalmic ramus (5th nerve) of course contracts the pupil, but irritation of its peripheral end does not dilate, on account of reflex activity of the motor oculi started by the irritation of fibres of recurrent sensibility. Total dilatation of the pupil can be induced by irritating a single one of the ciliary nerves. The effect is *very slow* on having a mild current, but prompt with stronger stimulus.

The contracting fibres exist in the trunk of the third nerve passing through the ciliary ganglion into the ciliary nerves. Section of the latter produces a more decided effect than division of the motor oculi, on account of a tonic action of the ganglion. The entire iris can be affected by irritation of a single ciliary nerve, probably on account of abundant peripheral inosculation. Simultaneous and equal irritation of ciliary nerves and cervical sympathetic produces only dilatation (by interference). But on using feeble currents on the sympathetic nerves and subjecting the motor oculi to strong reflex stimulation by light, the pupil contracts at first, dilating moderately afterward.

THE INFLUENCE OF THE FIRST CERVICAL GANGLION ON THE IRIS has been examined in frogs by J. Tuwim (*Pflüger's Archiv*, vol. 24, p. 115). By cutting the cervical sympathetic on one side, and extirpating the ganglion on the other, he finds on the latter side a narrower pupil. In other words, the presence of the ganglion exerts a tonic influence on the musculature of the iris. In order to avoid errors, the definite observations should be made 24 hours after the operation, to escape the effects of transitory irritation. The statement is one of capital importance, since this would be the first instance of any well-proven action of a sympathetic ganglion. The result can be demonstrated also by the destruction of the cord and brain and of the ganglion of one side, whereupon the corresponding pupil contracts more than the pupil still connected with its ganglion. The ganglion does not receive any pupil-dilating fibres by anastomosis from the hypoglossal, as Budge had asserted. For the mammal the author claims, likewise, a direct influence of the first cervical ganglion on the iris. He

maintains that the degeneration of the divided sympathetic does not occur as long as the ganglion exists. But his article does not furnish adequate proof. He claims, further, a difference in the size of the pupil according to whether the sympathetic nerve is severed alone or the ganglion removed. But his observations are so imperfectly reported as not to inspire confidence, at least for his experiments on mammals.

IRRITABILITY AND CONDUCTIBILITY OF NERVE FIBRES.—

Many attempts have been made to separate these two properties, for instance, by Schiff and by Grünhagen, who both claimed that the irritability of a portion of a nerve could be destroyed, while influences generated higher up could yet pass through this part. Extending an experiment proposed by Grünhagen, J. Szpilinan and Luchsinger have arrived at some interesting results (*Pflüger's Archiv*, vol. 24, p. 347). The experiment consists in exposing a part of the trunk of a frog's nerve to the action of CO_2 in a glass tube, through which the nerve is drawn. The irritability is tested, both at the cut end and at the part exposed to the gas, by electrodes, connected with an induction coil. Grünhagen had claimed that the CO_2 could deprive the nerve of its local irritability, but leave intact the power of conduction. But the authors found different results. In the first place, they were struck with the greater irritability of the nerve at the cut end, which diminished gradually as the nerve is tested nearer to the muscle. They, hence, contend for Pflüger's avalanche theory, but overlook that this result is to be found only in divided nerves. On poisoning a part of the nerve with CO_2 , Grünhagen's result is apparently obtained, but on continuing the experiment the following was noticed: The lower (poisoned) part is not irritable; it merely requires a stronger current. But on allowing the agent to act further, the upper end is now found wholly deprived of irritability, while the lower part is still excitable. In other words, the effect of CO_2 , and still more of ether or any other anæsthetic, or NH_3 applied to one part of the nerve, causes the nerve to lose its excitability from the centre toward the periphery. On removing the poisonous vapor by a current of air, the excitability is recovered in the reverse order. The authors, hence, claim that conductivity depends upon the propagation of the excited state from one molecule to the other.
